men of the more competent type is becoming more serious every day, because the demand for skilled mechanicians increases with the introduction of improved machine tools, and the problem is, in what way can we hope to insure a supply of thoroughly well-trained competent machinists.

It will of course be said by a certain class of critics that the workshop is the only place in which such a training must be obtained, but this is not the opinion of some of the best-informed American engineers.

A movement is on foot in America for securing a special training, by the founding of schools for the purpose of training machinists thoroughly from the earliest stages upwards. On this point a most valuable paper has recently been contributed to the American Society of Mechanical Engineers on "The Education of Machinists, Foremen, and Mechanical Engineers," by Prof. M P. Higgins, of Worcester, Mass., U.S.A., in which, after recommending the formation of workshop schools, he says, "America has made a strong beginning as an export nation of high grade machines. There are many evidences of keen interest amounting to surprise and alarm on the part of our European rivals. It is interesting to note their efforts to discover the cause of this sudden uprising of a new and evidently powerful rival in a field heretofore all their own.

"The cause of our supremacy," he says, "has not been altogether the superiority of our high-class engineers, for they also have highly educated engineers. But it has largely resulted from the superior character and make-up of our *mechanics*, which has come from the chance which America gives the workmen, and in the liberal and wise provisions to train American boys, giving each a fair field and open path to rise from one plane to a higher one, as his abilities and circumstances may warrant.

"We must not allow ourselves to rest secure in the belief that our Old World competitors will be slow to discern this cause or slow to profit by the example. Therefore, what more potent steps can we take for our protection than to keep this path open from the bottom, and to better our methods all the way up through the successive stages?"

In what way may the schools help to more effectually prepare our youths for the task which lies before them?

The Elementary School.—I begin at the elementary school because the problem before us is one which can only be solved by laying a good foundation at the very beginning, and proceeding upwards by a properly organised system of training towards the result which we desire to obtain.

Our British system of elementary school training is probably equal to that of any country in the world, but we have to regret the very early age at which the majority of boys pass away from the influences of the school. This is in part due no doubt to the feeling on the part of parents, especially of the lower classes, that after having passed the ordinary standards there is no necessity for any further stay at school, as the subjects taught are assumed to have little or nothing to do with the immediate requirements of life outside the school.

The opening in many large centres of Higher Grade Schools, in which pupils who have reached the higher standards may receive instruction at low fees, in science and in manual work, has been generally productive of much good, by retaining in the school pupils who would otherwise have left at an earlier age; and in these Higher Grade Schools pupils of exceptional ability, as tested by the ordinary system of examinations, have been selected, and in many cases specially trained, for scholarships or for examinations admitting them to the universities. But an idea is beginning to dawn upon us that perhaps, after all, there may be, among the very large majority of boys who are never among those selected to receive any special training to pass university examinations, and who have no special aptitude in the direction of acquiring book knowledge, much real ability in other directions, in fact, that they may be, as it were, a kind of unworked mine of possibilities and resources.

Hitherto they have been looked upon as the wasters of the school, but it is almost certain that the great inventors and mechanicians of our time have not usually come from the class of boys who are looked upon as the most successful students. Usually the "clever boy" is the one who, by his ability, in the particular direction by which the schools measure ability, succeeds in escaping from the workshop and in doing, as he would consider, better for himself by obtaining other employment.

Every Higher Grade School in which work is carried to the extent of providing school laboratories for, say, chemistry and physics, which, by the way, is a very good and necessary provision, should provide also an alternative course in a school workshop for the type of boy well known to teachers whose tendencies are more mechanical than scientific, who would be likely to make much more progress if trained in a workshop than in a chemical laboratory; and who would certainly pay for such training.

Every teacher who has had experience with the teaching of science to boys knows that the class consists of two distinct types; first, those who are fitted by careful training to become successful students, and to take a more or less high position in public examinations, who in fact are aiming at passing some examination as a means to their future progress; and secondly, those who have no prospect of such success, and whose future success will depend, if they succeed at all, upon other qualifications.

Now this latter class includes the majority of the pupils. They contain also the class from which will be drawn in the future the workers, and in some cases the leaders, in our industries, and these boys have, equally with the other boys, a reasonable claim upon all that the school can do for them to prepare them for their future. To meet then the case of these boys the workshop course should be an altogether different course from that hitherto provided. It should be equipped with as much care and as much completeness in its way, for the purpose of training this type of boy, as is the chemical or physical laboratory, and the educational value of such training need be in no sense inferior to that of any other course of study.

It is assumed that boys in such a school have already done a woodwork course, and if so they would here receive an iron-work course in a workshop supplied with a good selection of tools, including some small but good types of machine tools driven by a gas engine or electric motor. The effect of providing such a course of instruction would be to select, by a natural system, the type of boy likely to profit by the training received, and to retain these boys for a much longer period than would otherwise be possible. But the success of such school workshops would depend largely upon the course of instruction given, and upon the quality of the teacher giving it. The course should include practical work in the shops, the arithmetic of machines, geometry, machine drawing and design, and elementary applied mechanics. Each of these subjects is capable of indefinite extension, but it is of great importance that the early teaching should lay a good foundation upon which the future may be built, and that nothing should be learned which will afterwards require to be unlearned.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

It is announced that a copy of the charter and statutes which are to govern the new University of Birmingham, has been laid on the table of the House of Commons. This contains a list of honorary and other officers covered by the terms of the charter, but only three persons are mentioned who have been definitely appointed to positions in the new University. The first Chancellor will be Mr. Chamberlain. No name is associated with the office of Principal, which is to be a Crown appointment, made through the Lord President of the Council, but the Vice-Principal nominated is Dr R. S. Heath, who has been acting Principal of Mason University College. The appointment of the first Dean of the Faculty of Medicine has been conferred on Dr. B. C. A. Windle, F.R.S.

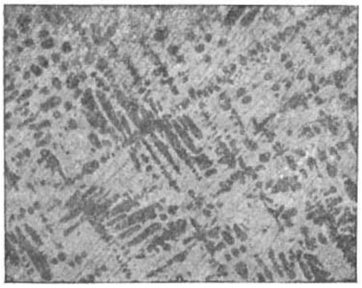
SOCIETIES AND ACADEMIES.

London.

Royal Society, December 7, 1899.—"Gold Aluminium Alloys." By C. T. Heycock, F.R.S., and F. H. Neville, F.R.S.

The freezing point curve for mixtures of gold and aluminium consists of seven branches, each branch corresponding to equilibrium between liquid and the first solid which forms as the system cools. Seven substances can also be detected by a microscopic examination of the solid alloys. They are gold, Au_4Al, Au_5Al_2, or perhaps Au_8Al_3, Au_2Al, a body which is probably AuAl, Roberts-Austen's purple $AuAl_2$, and aluminium. With the exception of $AuAl_2$ the compounds are white in colour. The bodies Au_2Al and $AuAl_2$ are indicated by well-marked summits in the curve, their freezing points being 625° C. and 1062° C. respectively, the latter identical with the freezing point of gold. The lowest melting point is that of an alloy containing only 3·6 per cent. by weight of aluminium; this alloy melts at 527° C.

The photomicrographs accompanying the paper show that the minute structure of the alloys repeats itself at corresponding points of each branch of the curve. For example, near the summit of the branch corresponding to the pure alloy, Au_2Al, the photograph shows us more or less hexagonal polygons of this substance almost entirely filling the field, and only separated from each other by very fine lines of impurity. If we take a section of an alloy a little way below the summit, we see the polygons of Au_2Al surrounded by a ribbon-like network of mother substance. Still further down, the crystals of Au_2Al are scanty, and arranged in such regular patterns, generally in lines at right angles to each other, as to render it certain that they crystallised freely while surrounded by liquid. Finally, at the bottom of the branch, that is at the eutectic point, the large crystals of Au_2Al are absent, and the whole field is full of the mother substance, which is sometimes, but, as we explain in the paper, not always a eutectic mixture.



If, leaving the eutectic point, we ascend the next branch, these phenomena repeat themselves, but the primary crystallisation (that is the matter which solidified first) is now of a different substance.

The photograph reproduced is of an alloy which, taken as a whole, would have the formula $Au_{70}Al_{30}$. The darker part consists of Au_2Al, which crystallised first. The lighter ground, or mother substance, is in this case the pure body Au_5Al_2, and is not a eutectic mixture. The pattern is typical of a point on the curve situated a little way above a eutectic angle. (Magnification 45 diameters.)

Royal Microscopical Society, January 17.—Annual meeting.—Mr. E. M. Nelson, the President, in the chair.—The President announced with deep regret the death of the Treasurer, Mr. W. T. Suffolk. He was an old member of the Society, having joined it in 1863. In addition to acting as Treasurer for some years, he had examined and catalogued the slides, about 7700 in number, in the Society's cabinet, and had remounted a great number of them, which had been found to be leaking or otherwise imperfect.—A resolution expressing the great sympathy of the Council with Miss Suffolk, and also acknowledging her gift to the Society of her uncle's cabinet of slides, was read to the meeting, and at the request of the President the Fellows present endorsed the action of the Council by show of hands.—After the report of the Council for the past year and the statement of accounts had been read and adopted, the President announced that the following had been elected as officers and Council for the ensuing year:—President: Wm. Carruthers; Vice-Presidents: A. W. Bennett, G. C. Karop, A. D. Michael, E. M. Nelson; Treasurer: J. J. Vezey; Secretaries: Rev. Dr. W. H. Dallinger, Dr. R. G. Hebb; Ordinary Members of Council: J. M. Allen, Conrad Beck, Dr. R. Braithwaite, E. T. Browne, Rev. E. Carr, E. Dadswell, Sir Ford North, H. G. Plimmer, T. H. Powell, C. F. Rousselet, Dr. J. Tatham, G. Western; Curator: C. F. Rousselet.—The President then delivered the annual address on the work done during the past year in connection with the Society, including the standardisation of the substage and eye-pieces, and concluded by reading a paper, which was a continuation of the optical subjects dealt with in his previous addresses, and had special reference to the aplanatic oil immersion front and the construction of the Huyghenian eye-piece.—Mr. Michael proposed a vote of thanks to the President, not only for the address, but also for his eminent services to the Society during the time he had occupied the chair.—In this period he had given a series of addresses which will form an admirable record of the practical application of the principles upon which the optical part of the microscope was constructed.—Dr. Braithwaite having seconded the vote of thanks to the President, it was put to the meeting, and carried unanimously.—The President then introduced his successor, Mr. Wm. Carruthers, who, having taken the chair, gave a short address to the meeting.—Mr. Rousselet exhibited a mounted specimen of *Stephanoceros eichhorni*, a rotifer which is very difficult to kill with its cilia fully extended; but after many trials, Mr. Rousselet has succeeded in overcoming the difficulty, and the specimen exhibited presented a very life-like appearance.

Linnean Society, January 18.—Dr. A. Günther, F.R.S., President, in the chair.—Mr. J. C. Hill, of Sydney University, exhibited some photographs of specimens and drawings of Monotreme and Marsupial embryos, obtained by him in Australia. Of special interest were those of a newly-hatched *Ornithorhynchus*, showing a nasal caruncle and the presence of a medium maxillary tooth, the function of which is at present undetermined. Chief among the Marsupial series were photographs of *Dasyurus* embryos *in situ* and showing the free condition of the allantois. The Zoological secretary gave an account of a paper by Mr. H. M. Kyle, incident to an extended investigation of the flat-fishes now progressing. The author records in these and certain other Teleosteans the existence of "Nasal Sacs," originally observed by Owen, and more recently by Solger in the stickleback. He shows them to be secretory in the less specialised Pleuronectidæ, paired and non-secretory among the soles. Mr. George Massee read a paper on the origin of the Basidiomycetes. He remarked that Juel, a Danish mycologist, had recently demonstrated that *Stilbum vulgare*, hitherto regarded as a typical Hyphomycete, is a true Protobasidiomycete. Following up this hint, the majority of the species of *Stilbum*, some of which are the known conidial phase of species of *Sphaerostilbe*, and others existing without any known higher form, were examined, with the result that the conidial condition of *Sphaerostilbe microspora* and *S. gracilipes* proved to be identical in structure with *Stilbum vulgare*, in other words, true Protobasidiomycetes. This discovery reveals the fact that the conidial condition of an ascigerous fungus may be a true Protobasidiomycete. Similar discoveries had been made with forms of *Tubercularia* and *Isaria* known to be the conidial stages of ascigerous fungi.

MANCHESTER.

Literary and Philosophical Society, January 23.—Prof. Horace Lamb, F.R.S., President, in the chair.—Mr. C. E. Stromeyer read a paper on the origin of granite, in which he suggested that, as the melting temperatures of solids are either raised or lowered by pressure, and as the melting temperatures of felspar and hornblende are certainly raised by pressure, it may be found that the melting temperature of quartz is lowered under such conditions; if that were seen to be the case, a satisfactory explanation would be afforded why the order of crystallisation of granite-forming minerals is the reverse of the order of their melting temperatures, because at the depths below the earth's surface where these melting temperatures are reached the pressures are sufficiently great to account for variations of melting temperatures of several hundred degrees. Clerk Maxwell even assumed that the melting temperature of these minerals would be so materially raised that the earth's centre must necessarily be solid. No experiments having as yet been made on quartz, the author suggested that, if sufficiently small specimens of this mineral were experimented upon in Prof. Joly's meldometer, the molecular pressure—which for water is said to be 5000 atmospheres—would affect the melting temperature very materially, and by this means the question as to the origin of granite would be advanced one step.—A paper, entitled "Notes on some Jurassic plants in the Manchester Museum," by A. C. Seward, F.R.S., was communicated by Prof. F. E. Weiss. The late Prof. W. C. Williamson collected from the inferior oolite rocks exposed in the cliff sections south of Scarborough a number of fossil plants, of which he sent drawings and descriptive notes to Prof. Lindley, who figured a number of them in the classic "Fossil Flora." Some of these plant-remains, now in the Manchester Museum—to which they were presented by Prof. Williamson—Mr. Seward has subjected to a renewed critical examination, with the result that he finds many of them identical with fossil plants described previously under other names by Brongniart. Thus, *Sphenopteris arguta*, Lindley and Hutton = *Coniopteris hymenophylloides*, Brongniart; *Pecopteris dentata*, L. and H. = *Todites williamsoni*, Brong.; *Otopteris cuneata*, L. and H. = *Sagenopteris phillipsi*, Brong. Some other specimens figured by Lindley and Hutton under one name are, according to the author, identical with other plant-remains which had been differently identified. Thus, *Thuites expansus*, figured on Pl. 167, is specifically identical with *Brachyphyllum manillare*, figured on Pls. 188 and 219. Other Jurassic plant-remains in the Manchester Museum were also described by Mr. Seward, and their systematic position critically discussed.

CAMBRIDGE.

Philosophical Society, January 22.—Mr. Larmor, President, in the chair.—Experiments on the periodic movement of plants, Miss D. F. M. Pertz and Francis Darwin. The first part of the paper is practically a continuation of the authors' research on the artificial production of rhythm in plants, published in the *Annals of Botany*, 1891. The second part deals with a new example of periodic movement. If a "sleeping" plant is placed in a dark room after its leaves have assumed the nocturnal position, it will "awake" next morning, *i.e.* its leaves will return to the diurnal position, in spite of the darkness. In the experiment described, the procedure was varied by exposing the plants to one-sided illumination; in these circumstances the leaves are well known to assume certain characteristic oblique positions. The point of the experiment is that if a plant is darkened after having responded in the above manner to one-sided illumination, it returns to the oblique position on "awaking" next day in complete darkness.—Wealden plants from Bernissart, A. C. Seward. A brief account was given of a collection of plants in the Natural History Museum of Brussels which was obtained from argillaceous rocks at Bernissart, a locality rendered famous by the discovery in 1877 of more than twenty complete skeletons of *Iguanodon*. The beds containing the Iguanodons and plants occupy a gorge, 250 m. deep, bounded on either side by carboniferous strata. A short list of species of Bernissart plants was published in 1878 by M. Dupont (*Bull. Ac. R. Belg.*, vol. xxvi. [2] 1878, p. 387), the identifications being made by the late Marquis of Saporta. Through the courtesy of M. Dupont, the Director of the Brussels Museum, the writer has recently examined the collection, which consists of numerous small fragments of typical Wealden species. The flora is represented by fragmentary samples which appear to have been transported for a considerable distance, and finally deposited in a fine freshwater argillaceous sediment. A striking feature of the flora is the scarcity of Gymnosperms; nearly the whole of the material consists of fragments of fern fronds, *Weichselia Mantelli* being by far the commonest species. The evidence afforded by the plants points unmistakably to a Wealden age, nearly all the species being identical with those described from the Wealden rocks of the Sussex coast, the north German area and elsewhere.—On the biology of Bulgaria polymorpha, R. H. Biffen. The life-history of this fungus has been studied in detail by means of cultures grown on blocks of sterilised oak-wood.

EDINBURGH.

Royal Society, January 22.—Prof. Copeland in the chair.—Dr. Peddie, in a communication on the torsional constants of iron and steel, stated that he obtained for steel results similar to those already obtained for iron. A linear relation was found to hold between log b and n, where x and n are the parameters in the oscillation equation $yn(x+a)=b$, in which x is the number of oscillations reckoning from the commencement of any experiment, and y is the amplitude of oscillation. The line representing this linear relation varies in inclination with the state of fatigue of the wire; but, for the same wire, these lines all pass through one point. This gave a quantity which might be regarded as measuring a definite elastic quality of the metal. The results showed that iron was, as regards elastic properties, about six times worse than steel.—Prof. Kuenen gave a simple proof of Gibbs' phase rule, that a system of n independent substances existing in r phases in equilibrium is capable of $(n-r+2)$ independent variations. It was first shown that the total number of variables was $(n-1)r+2$. Then, by a simple application of the second law of thermodynamics to the conditions of equilibrium, it was shown that these conditions were $(r-1)n$. The difference of these two expressions gives the phase rule.—Prof. Kuenen also read a paper on the change with temperature of the coefficient of absorption of a gas in a liquid. Several experimenters had obtained evidence that in some cases the coefficient of absorption passes through a minimum as the temperature rises. Having been asked by Prof. Ramsay if the phenomenon might not be connected with the approach to the critical point, he had looked into the question, and by a comparison of the vapour-pressure curve for a mixture with the curve for the solvent in the case of hydrogen and carbon dioxide he found that the coefficient must increase as the critical temperature is approached. Then, the coefficient of absorption being in the vast majority of cases high at low temperatures, it follows that it must pass through a minimum as the temperature rises.—Mr. W. B. Blaikie exhibited his "Cosmosphere," which consists of a terrestrial globe surrounded by a concentric celestial sphere of celluloid. The instrument is useful for demonstrating a great variety of problems in astronomy and navigation. From the cosmosphere in its complete form had been evolved a slide-rule, which solved by inspection many of these problems. It consisted of two celluloid sheets inscribed with projections of the hemisphere with longitude and latitude lines. The hemispheres were accurately superposed, and the upper one could be rotated and clamped in any position relatively to the under. Mr. Blaikie demonstrated the value of the slide-rule by solving with great ease problems requiring, as usually treated in books, a considerable amount of intricate mathematics. The solutions were correct to about a quarter of a degree.

PARIS.

Academy of Sciences, January 29.—M. Maurice Levy in the chair.—Contribution to the study of the radium radiations, by M. Henri Becquerel. Different preparations of radium salts emit rays which are equally deviated in the magnetic fields, differing only in intensity. The results are independent of the presence of air.—Note on the crystalline and volcanic rocks of Southern China, by MM. Michel Levy, A. Lacroix and Leclère. The results of an examination of the specimens collected by M. Leclère on his recent expedition in China. From Hien-Bai to Tali-Fou the rocks are chiefly felspathic and micaceous schists. In the stanniferous region of Ko-Tioú the granitic schists are traversed by tourmaline pegmatites, whilst the line of fracture of Khin-Gan is marked by the appearance of a coarsely crystalline granite containing biotite.—The Gard coal basin, by M. Marcel Bertrand. The author combats the generally accepted view that the break between the upper and lower coal-measures (Stephanian and Westphalian) is the chief fact dominating the history of the chain, and puts forward a view co-ordinating and explaining in a simple manner all the anomalies of the basin.—On the molecular volumes of some camphor derivatives, by MM. A. Haller and P. Th. Muller. The results of the densities of eighteen camphor derivatives, partly pure, and partly taken in toluene solution, are tabulated and the results compared with those calculated by Traube's formula.—Materials of topological study for Algeria and Tunis, by M. Bassot. Remarks on the tenth volume of the "Cahiers du Service géographique de l'Armée."—M. Mittag-Leffler was elected a Correspondent for the Section of Geometry, and M. Bienaymé for the Section of Geography and Navigation.—The President announced to the Academy the loss by death of M. Marion, Correspondent for the Section of Anatomy and Zoology, and of Mr. D. E. Hughes.—Remarks by M. Milne-Edwards on the work of M. Marion.—Observation of the Leonids of 1899 in Russia, by M. S. de Glasenapp. Although the conditions were unfavourable, owing to the state of the sky, observations of 745 Leonids were made, 394 of which were seen during the night of November 14.—On the proper motion of stars near the sun, by M. Duponchel.—On some partial differential equations, by M. H. Duport.—On the existence of second differentials of potential, by M. Henrik Petrini.—On the law of the resistance of the air to the motion of projectiles, by M. Paul Vieille. A comparison of the resistance per square centimetre observed for a cylindrical projectile, having a plane face at right angles to the direction of motion, and calculated from the formulæ of MM. Riemann and Hugomot, shows that these are practically identical. The temperature corresponding to various velocities is also calculated, and lead to the conclusion that the temperatures of meteors, even taking into account the low pressure of the medium traversed, are amply explained by the law of propagation of discontinuities.—On the decomposition of a luminous motion into simple elements, by M. Ch. Fabry.—On the constitution of white light, by M. Gouy.—Polarised light emitted by a Geissler tube submitted to the action of a magnetic field, by M. R. Dongier. The intensity of the red ray of hydrogen is distinctly reduced in a magnetic field; similar effects, but less marked, are observed with tubes containing chlorine, nitrogen, carbon dioxide, carbon monoxide and argon, the spectrum of the latter undergoing curious modifications in the magnetic field.—Time of establishing the electric spark, by MM. H. Abraham and J. Lemoine. The duration of the Kerr effect in carbon bisulphide is divided into three parts, the duration of the establishment of the luminous intensity of the spark, the time of discharge, and the time during which the carbon bisulphide preserves its doubly refracting power after the electric field has disappeared. Each of these phenomena, taken singly, has a duration of less than 1/100,000,000 of a second.—On the detection of silver in presence of mercury amido-chloride, by M. F. Leteur. From a mixture of silver and mercurous chloride it is not possible to extract the whole of the silver salt with aqueous ammonia, since when the silver chloride is small in proportion to the calomel, nearly the whole of it is retained by the mercury amido-chloride formed, even after repeated digestions with ammonia.—Action of copper upon acetylene; formation of a condensed hydrocarbon, cuprene, by MM. Paul Sabatier and T. B. Senderens. Acetylene, passed over copper heated to 200° undergoes a complicated transformation, giving a liquid hydrocarbon and a mixture of ethylene, propylene, butylene, ethane, and hydrogen. At the same time the copper becomes coated with a solid deposit, of the composition $(C_7H_6)n$, to which the name of cuprene is given.—Acidimetry of the polybasic organic acids, by M. A. Astruc.—On isopyromucic acid, by M. L. J. Simon. The author has succeeded in obtaining good yields of the isopyromucic acid discovered by Limpricht, the existence of which has been denied by Oliveri and Peratoner, by the dry distillation of a mixture of mucic acid (350 gr.) and potassium bisulphate (550 gr.). The exact constitution of the acid is not yet worked out.—Genesis of terpene compounds in lavender, by M. Eugène Charabot.—On a new method for the extraction of india-rubber contained in the bark of divers plants, especially of *Landolphia*, by MM. A. Arnaud and A. Verneuil. The bark, finely powdered and ground up with warm water, gives up the whole of its india-rubber, no chemical reagent being necessary.—Defence of the organism against the injurious effects of glandular secretions, by MM. Charrin and Levaditi.—The intestinal reabsorption of sugars, by M. E. Hédon.—The peripheric organs of the sense of space, by M. E. de Cyon.—Photogrammetric focimetry in microscopy, by M. V. Legros.—On the endomorphic transformations of santoxin andesite, under the influence of calcareous enclosures, by M. A. Lacroix.—On the non-existence of the hexagonal system, by M. Fréd. Wallerant. The author concludes from the discussion of the crystallography of nepheline, potassium sulphate and arragonite, that the hexagonal system has no real existence in nature, and has only a theoretical importance.—The geology of Southern Australia, by M. Jules Garnier.

DIARY OF SOCIETIES.

THURSDAY, FEBRUARY 8.

ROYAL SOCIETY, at 4.30.—The Spectrum of α-Aquilæ: Sir N. Lockyer, K.C.B., F.R.S., and A. Fowler. (1) On the Production of Artificial Colour-blindness by Moonlight: (2) On the Relation of Artificial Colour-blindness to Successive Contrast: G. J. Burch.—On Electrical Effects due to Evaporation of Sodium in Air and other Gases: W. C. Henderson.—On Electric *Touch* and the Molecular Changes produced in Matter by Electric Waves: Prof. J. C. Bose.

ROYAL INSTITUTION, at 3.—Modern Astronomy: Prof. H. H. Turner, F.R.S.

CHEMICAL SOCIETY, at 8.30.—Victor Meyer Memorial Lecture: Prof. T. E. Thorpe, F.R.S.

SOCIETY OF ARTS (Imperial Institute), at 4.30.—The Projects of Railway Communication with India: J. M. Maclean.

MATHEMATICAL SOCIETY, at 8.—A Formula in the Theory of the Theta-Functions: Prof. A. C. Dixon.—Some Elementary Distributions of Stress in Three Dimensions: J. H. Michell.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—The Standardisation of Electrical Engineering Plant: R. P. Sellon.

CAMERA CLUB, at 8.15.—Steam Turbines, Land and Marine: A. A. Campbell Swinton.

FRIDAY, FEBRUARY 9.

ROYAL INSTITUTION, at 9.—Symbiosis and Symbiotic Fermentation: Prof. J. Reynolds Green.

ROYAL ASTRONOMICAL SOCIETY, at 3.—Anniversary Meeting.

PHYSICAL SOCIETY, at 5.—Annual General Meeting.—Address by the President, Prof. O. J. Lodge, F.R.S.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Underground Sources of Water-Supply: D. E. Lloyd-Davies.

MALACOLOGICAL SOCIETY, at 8.—Annual General Meeting.—Also, Lecture on the Pearly Nautilus: Dr. Arthur Willey.

MONDAY, FEBRUARY 12.

SOCIETY OF ARTS, at 8.—The Nature and Yield of Metalliferous Deposits: Bennett H. Brough.

CAMERA CLUB, at 8.15.—Mountaineering in Switzerland and Scotland: Prof Norman Collie.

TUESDAY, FEBRUARY 13.

ROYAL INSTITUTION, at 3.—Structure and Classification of Fishes: Prof. E. Ray Lankester, F.R.S.

INSTITUTION OF CIVIL ENGINEERS, at 8.—*Papers to be further discussed:* Moving Loads on Railway Underbridges: W. B. Farr.—Note on the Floor System of Girder Bridges: C. F. Findlay.——*Paper to be read, time permitting:* Corrosion of Marine Boilers: John Dewrance.

ROYAL PHOTOGRAPHIC SOCIETY, at 8.—Annual General Meeting.

ANTHROPOLOGICAL INSTITUTE, at 8.30.

WEDNESDAY, FEBRUARY 14.

SOCIETY OF ARTS, at 8.—The Diffraction Process of Colour Photography: Prof. R. W. Wood.

ESSEX FIELD CLUB (at Bishopsgate Institute), at 7.—Some New Sections in, and Contributions to, the Fauna of the River Drift of the Uphall Estate, Ilford: J. P. Johnson and G White.—The Stalk-eyed Crustacea, their Families and Genera; with especial reference to the Essex Species: Edward Lovett.

THURSDAY, FEBRUARY 15.

ROYAL SOCIETY, at 4.30.—*Probable Papers:* The Genesis and Development of the Wall and Connecting Threads in the Plant Cell. Preliminary Communication: W. Gardiner, F.R.S.—Total Eclipse of the Sun, January 22, 1898. Observations at Viziadrug: Sir N. Lockyer, F.R.S., Captain Chisholm-Batten, and Prof. A. Pedler, F.R.S.—Photographs of Sound Waves: Prof. R. W. Wood.

ROYAL INSTITUTION, at 3.—Modern Astronomy: Prof. H. H. Turner, F.R.S.

LINNEAN SOCIETY, at 8.—Photography of British Plants: J. C. Shenston.—A New Land Planarian from the Pyrenees: Dr. R. F. Scharff.

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